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## Chronic phimosis as a cause of obstructive uropathy in an adult patient

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### Summary

- Background:** Phimosis is a rare cause of obstructive uropathy and renal failure. This report presents a case of a 22-year-old man with phimosis, resulting in such complications.
- Case report:** The patient with incidentally revealed elevated serum creatinine level was subjected to ultrasonography, voiding cystourethrography and static fluid MR urography (sMRU), combined with conventional T1- and T2-weighted images. The urinary tract dilatation and the bladder diverticula were diagnosed with the use of imaging modalities. Two months after circumcision the degree of hydronephrosis as well as creatinine level decreased.
- Conclusions:** The obstructive uropathy involving the upper urinary tract and resulting in renal failure may develop on the basis of chronic phimosis.
- Completing of standard imaging techniques with MR urography significantly improved the possibility of the urinary tract evaluation in the presented case.
- Key words:** phimosis • obstructive uropathy • magnetic resonance urography
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### Background

There are several causes of obstructive uropathy. The sub-vesical obstacles resulting in urinary obstruction include: sclerosis of the bladder neck, prostatic diseases, valvula of the posterior urethra, urethral diverticula, stricture of the external urethral meatus (commonly associated with hypospadias) and rarely - phimosis.

Phimosis, i.e. inability to retract the foreskin, is the abnormality affecting 1-10% of boys. It should be differentiated from the adhesion between the foreskin and the glans which is found in neonates and infants and associated with maturation of the glans. The term "physiological phimosis" is used for this condition [1]. In about 90% of boys under 3 years of age the foreskin is retractable, while in 17-year-old adolescents the percentage is 99% [2].

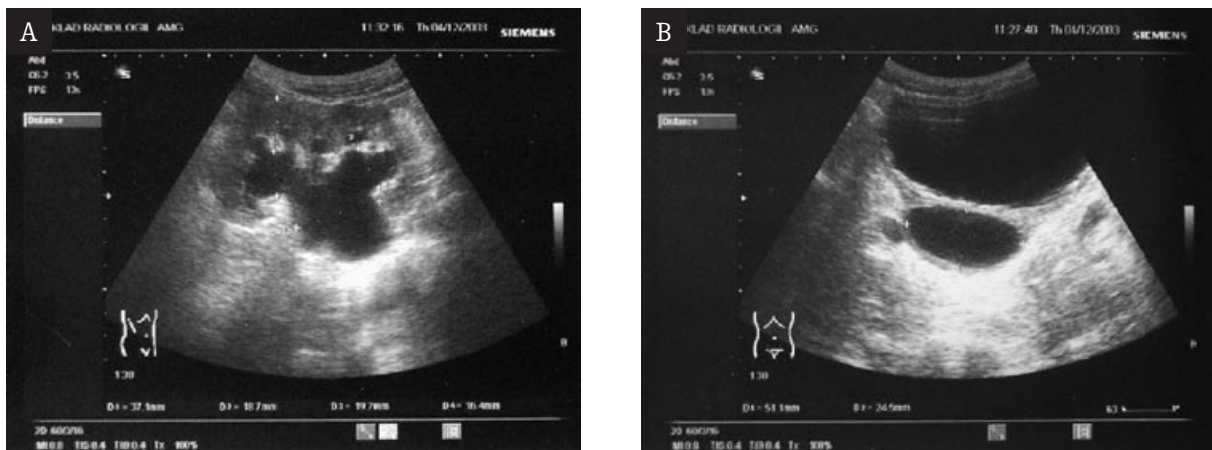
As there are only a few literature data concerning chronic phimosis resulting in obstructive uropathy and renal failure, a case of a patient with such abnormalities has been reported.

### Case report

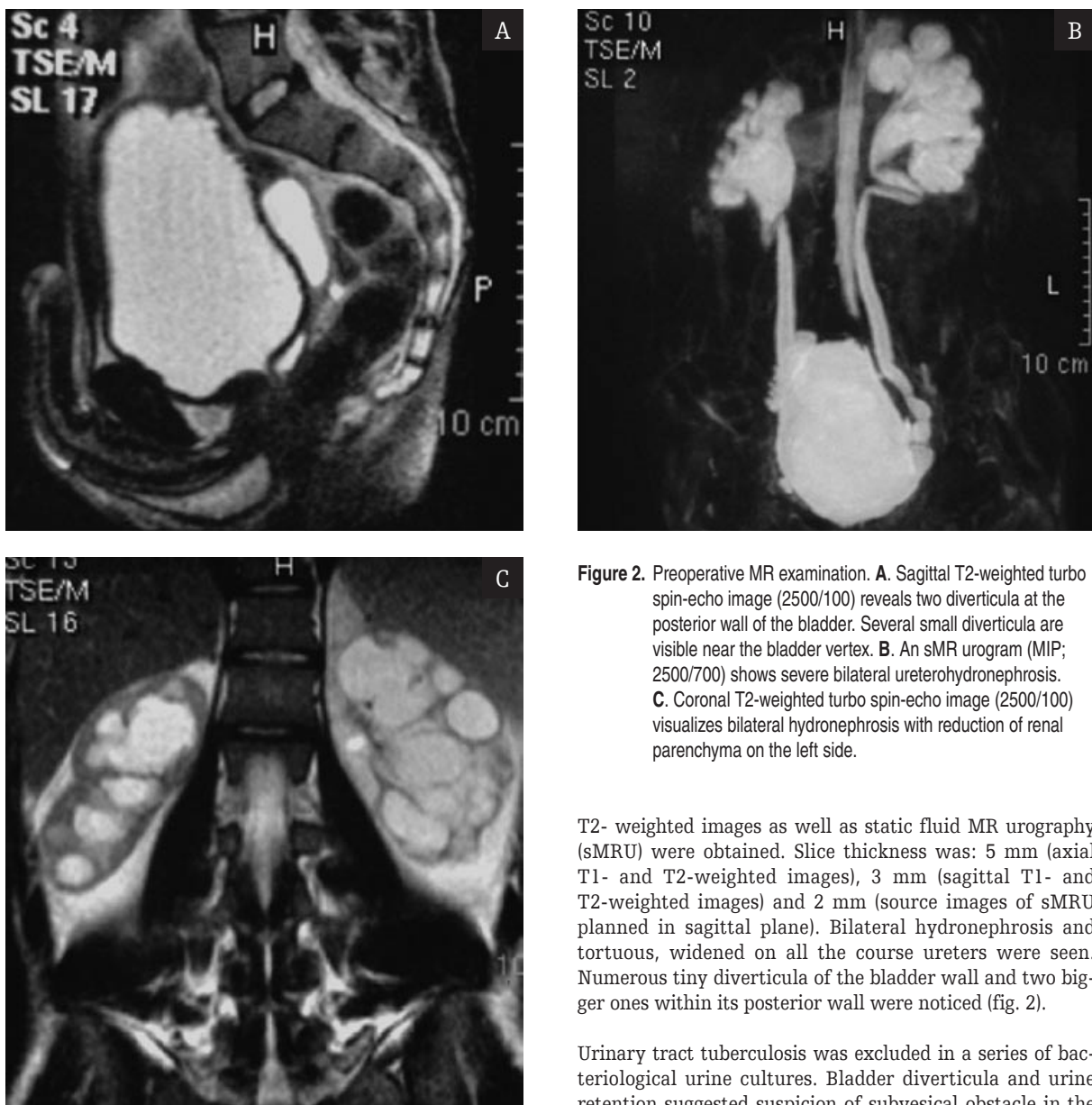
A 22-year-old male with pulmonary tuberculosis (confirmed by both bacteriological and radiological examinations) was admitted to the Department of Pulmonology for anti-tuberculosis therapy. Accessory laboratory tests revealed elevated serum creatinine concentration to 505  $\mu\text{mol/L}$  (6,53 mg/dL).

Ultrasonography displayed bilateral hydronephrosis, more intensified in the left kidney, the parenchyma of which was significantly narrowed. Both ureters visible within the subpelvic and perivesical segments were markedly dilated. The bladder wall was very thickened and irregular. Behind the bladder there were noticed two fluid spaces showing no clear connection with it (fig. 1). After twofold micturition urine retention was about 400 mL.

Secondary MR examination of the urinary tract was performed using 0,5 T scanner (Gyrosan T5NT, Philips, Eindhoven, The Netherlands). Conventional T1- and



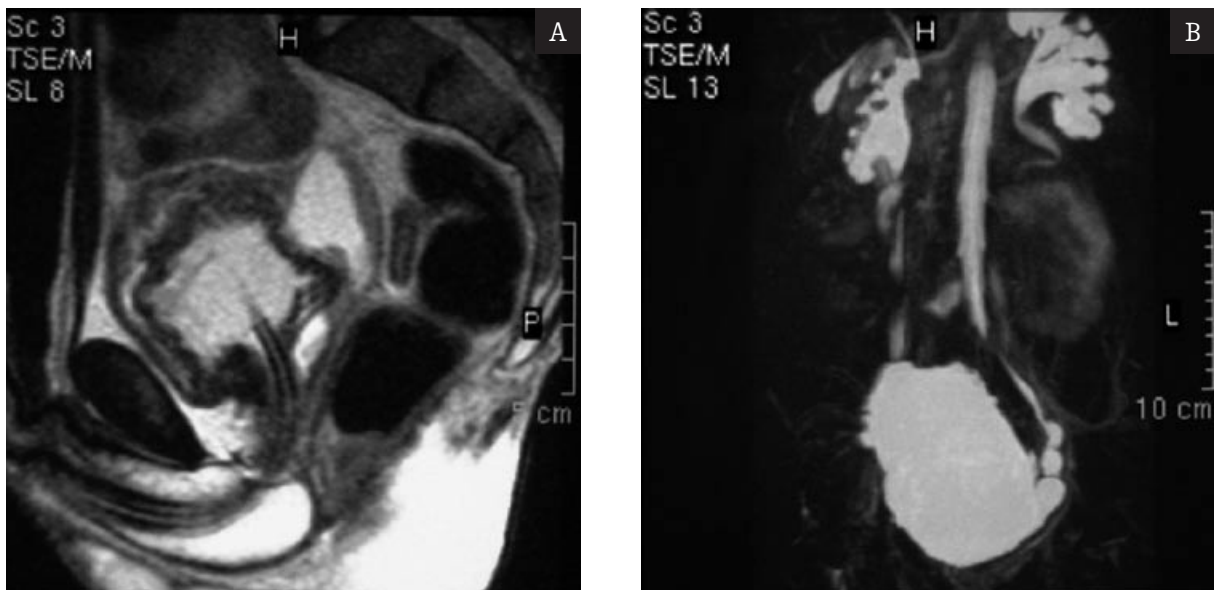
**Figure 1.** Initial ultrasonography prior to operation. **A.** Sonogram of the right kidney shows hydronephrosis (observed also on the left side). **B.** Fluid space is noted behind the bladder.



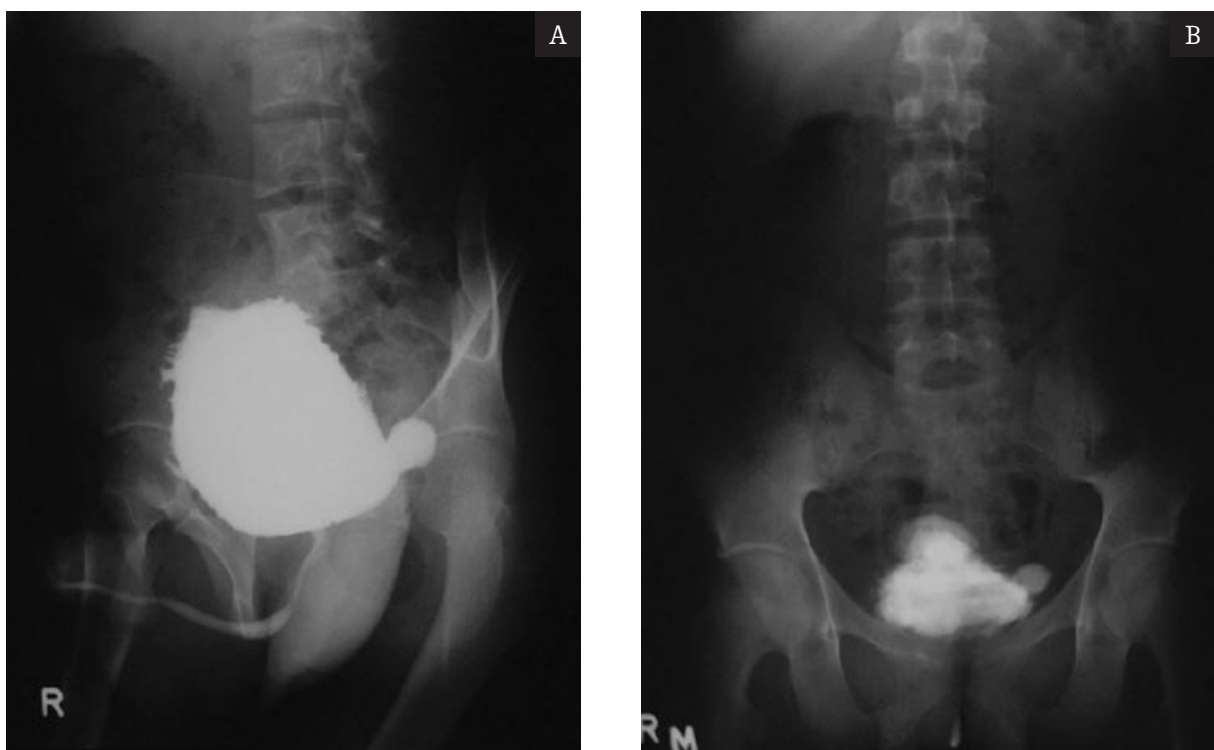
**Figure 2.** Preoperative MR examination. **A.** Sagittal T2-weighted turbo spin-echo image (2500/100) reveals two diverticula at the posterior wall of the bladder. Several small diverticula are visible near the bladder vertex. **B.** An sMRU urogram (MIP; 2500/700) shows severe bilateral ureterohydronephrosis. **C.** Coronal T2-weighted turbo spin-echo image (2500/100) visualizes bilateral hydronephrosis with reduction of renal parenchyma on the left side.

T2- weighted images as well as static fluid MR urography (sMRU) were obtained. Slice thickness was: 5 mm (axial T1- and T2-weighted images), 3 mm (sagittal T1- and T2-weighted images) and 2 mm (source images of sMRU planned in sagittal plane). Bilateral hydronephrosis and tortuous, widened on all the course ureters were seen. Numerous tiny diverticula of the bladder wall and two bigger ones within its posterior wall were noticed (fig. 2).

Urinary tract tuberculosis was excluded in a series of bacteriological urine cultures. Bladder diverticula and urine retention suggested suspicion of subvesical obstacle in the



**Figure 3.** MRI performed 3 days after circumcision. **A.** On sagittal T2-weighted turbo spin-echo image (2500/100) urine accumulation within thick anterior wall of the bladder is observed. Diverticula at the posterior wall are filled with the urine to a larger extent in comparison with the preoperative MR examination. **B.** An sMR urogram (MIP; 2500/700) reveals a decrease of ureterohydronephrosis.



**Figure 4.** Voiding cystourethrography carried out 10 days after operation. **A.** Multiple diverticula of the bladder and no abnormalities of the urethra are noted. **B.** Post-voiding residue is visible within diverticula.

urine output. On the basis of exact physical examination phimosis was diagnosed. Directly after circumcision performed in the Department of Urology, creatinine level decreased to  $398 \mu\text{mol/L}$  (5,21 mg/dL).

A few days after circumcision another MR examination was carried out. The bladder wall was thickened, folded with small diverticula. Within the stratified muscular

layer of the anterior bladder wall urine accumulation was observed. The bigger of the two diverticula at the posterior wall diminished slightly. Hydronephrosis decreased, however there were still visible dilated subvesical ureteral segments (fig. 3).

Taking advantage of catheterization of the patient after circumcision, the cystourethrography was performed



**Figure 5.** The follow-up ultrasonography performed 8 weeks after surgery. The regression of hydronephrosis is observed on the sonogram of the right kidney.

to exclude additional urethral abnormalities and vesicoureteral reflux. The examination revealed normal picture of the urethra as well as intensified trabeculation of the bladder wall, several bladder diverticula and no vesicoureteral reflux after removal of the catheter (fig. 4).

In the follow-up ultrasonography (4 weeks after operation) the pelvicaliceal systems were still widened but in a less degree than before. Thickening of the bladder wall as well as its diverticula persisted. Post-voiding urine retention diminished to 200 mL.

After successful treatment of pulmonary tuberculosis (radiologically confirmed by regression of infiltrative changes) the patient discontinued hospitalization and was transferred to the Outpatient Clinic of Pulmonology and Nephrology.

Two months after surgery creatinine level decreased to 256  $\mu\text{mol/L}$  (3,35 mg/dL). In ultrasonography hydronephrosis further diminished (fig. 5). Narrowing of the cortical layer in the left kidney persisted, the distal parts of the ureters were still dilated. The sonographic picture of the urinary bladder remained unchanged.

## Discussion

Phimosis develops on the basis of recurrent balanoposthitis caused by *Staphylococcus aureus*, *Proteus vulgaris* and - rarely - by viruses [3]. Lichen sclerosus et atrophicus is a disease often leading to phimosis [4]. Chronic candidiasis, Bowen's disease, condylomata acuminata are dermatological entities less frequently causing phimosis. Cicatrization of the preputial orifice due

to forceful retraction of the foreskin as well as self-mutilation of the urethra are the additional propitious factors.

The onset of phimosis in an adult patient may be a sign of diabetes [5].

Worth mentioning is the theory by Volmar et al. according to which phimosis occurring in foetal development plays a role in pathogenesis of the prune belly syndrome defined as deficiency of the anterior abdominal wall, several urinary tract abnormalities and undescended testes [6].

Phimosis is treated conservatively (topical steroids) or operatively [7, 8, 9, 10].

Accumulation of smegma under the prepuce in the course of phimosis results in chronic balanoposthitis which may cause penile cancer [11].

The described case of 22-year-old man proves that phimosis can lead to changes of the bladder being a consequence of an increase in the intravesical pressure (hypertrophy of the bladder wall, diverticula) and to the upper urinary tract dilatation as well. Sometimes morphological lesions in the obstructive uropathy are completed by vesicoureteral reflux. Long-lasting abnormalities cause the reduction of renal parenchyma and renal failure. There are only a few literature data describing those complications [12, 13].

The presented diagnostic algorithm concerning the urinary tract imaging is especially recommended in patients with high creatinine level. Static fluid MRU using urine as natural contrast material is found to be a valuable complement to ultrasonography in those patients [14, 15, 16]. In conditions of intense urine retention sMRU visualizes the urinary tract without diuretic injection and oral hydration [17]. In the presented case thin slices of T1- and T2-weighted images and source images of sMRU (acquired in sagittal plane) enabled to assess the abnormalities of the bladder, especially those within its posterior wall. For evaluation of the urethra and vesicoureteral reflux voiding cystourethrography still remains a method of choice.

## Conclusions

The presented case proves that obstructive uropathy involving the upper urinary tract and resulting in renal failure may develop in adult patients with phimosis.

MR urography performed as a complement to standard methods (ultrasonography, voiding cystourethrography) improves the possibility of the urinary tract evaluation in patients with such complications.

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